

330

B385

1992:139 COPY 2

STX

Forward Integration in the United States, 1870-1920: An Organizational Economics Interpretation

Joseph T. Mahoney

Department of Business Administration

BEBR

FACULTY WORKING PAPER NO. 92-139

College of Commerce and Business Administration


University of Illinois at Urbana-Champaign

July 1992

Forward Integration in the United States, 1870-1920: An Organizational Economics Interpretation

Joseph T. Mahoney
Department of Business Administration

Accepted by the Management History Division for presentation at the 1992 Academy of Management meetings.



Digitized by the Internet Archive
in 2011 with funding from
University of Illinois Urbana-Champaign

FORWARD INTEGRATION IN THE UNITED STATES, 1870-1920:

AN ORGANIZATIONAL ECONOMICS INTERPRETATION

This paper considers the development of vertical control of distribution by manufacturers of technologically complex goods in the 1870-1920 period. An organizational economics approach considers markets, relational contracts, and vertical financial control as engaged in an ongoing institutional competition. An historical perspective provides rich institutional details that both complement and challenge current thinking on the formulation and implementation of vertical integration strategies.

FORWARD INTEGRATION IN THE UNITED STATES, 1870-1920:

AN ORGANIZATIONAL ECONOMICS INTERPRETATION

McCloskey (1985) persuasively argues that "good science is good conversation." Management science and business history would benefit enormously in conversation with each other. Currently, organizational economics has captured the attention of business scholars (Barney & Ouchi, 1986; Hesterly, Liebeskind & Zenger, 1990). In particular, theorists have been focusing on agency theory (Eisenhardt, 1989; Jensen & Meckling, 1987; Oviatt, 1988), transaction costs economics (Hill, 1990; Teece, 1982; Yao, 1988; Williamson, 1991) and the resource-based theory of the firm (Lippman & Rumelt, 1982; Penrose, 1959; Rumelt, 1984; Wernerfelt, 1984). However, organizational economic theorists (i.e., agency theorists, transaction costs theorists and resource-based theorists) have a tendency to develop elegant theoretical constructions to the neglect of real-world experience¹. The integration of theory and practice is long overdue in business school education (Bowman, 1990; Rumelt, Schendel & Teece, 1991).

The benefits from conversation between management science and business history are a two-way street. Williamson (1982: 8) argues that:

[B]usiness history and transaction cost [organizational] economics are, in important respects, made for each other. The reasons are not hard to find. Both deal at a similar microanalytic level of analysis. And while business history stands in need of what Henrietta Larson has referred to as 'an established system of theory' (1948: 135), transaction cost [organizational] economics has need for relevant institutional data.

Organizational innovation is an important factor in economic development (Eggertsson, 1990; North, 1990). Curiously, organizational innovation has been somewhat neglected by management researchers

¹ Leblebici (1990: 628) notes that: "In light of the overabundant theoretical arguments developed in recent years on the nature of managerial business enterprise, it is refreshing to read Professor Chandler's new book [Scale and Scope], which offers a needed historical perspective."

who have often failed to relate administrative coordination to the economic theory of the firm and economic performance. As Cole has observed: "If changes in business procedure and practices were patentable, the contribution of business change to the economic growth of the nation would be [more] widely recognized..." (1968: 61-62). Important organizational innovations include refinements in cost accounting, collective bargaining procedures, personnel and work scheduling, and changes in manufacturer-distributor relationships (Chandler, 1962, 1977, 1990).

This paper focuses on a specific organizational change: the selective forward integration by manufacturers into distribution in the 1870-1920 period. While this period has been extensively studied from a business historian's perspective (Chandler, 1977), this paper links the historical record with current management and economic thought on vertical integration (Harrigan, 1984; Williamson, 1979). The 1870-1920 period is particularly appropriate for analyzing vertical integration since in these decades revolutionary change was experienced in the processes of production and distribution in the United States (Higgs, 1971). In the 1870s nearly all U.S. industrial enterprises relied on commissioned agents, wholesalers, and other middlemen to sell their finished products (Chandler, 1962). In the 1880s, however, as the basic transportation and communication structure was near completion (DuBoff, 1980; Lebergott, 1966; Robertson & Walton, 1979; Thompson, 1947), enterprises began to integrate mass production with mass distribution. Barger (1955) records that in 1889 wholesalers handled over sixty percent of the flow of goods but by 1929 they handled less than thirty percent. This paper considers the economic and managerial reasons for this dramatic change in vertical relationships in the U.S. economy.

Caveat emptor. To be sure, all facts are value-laden and theory-laden (Kaplan, 1964; Kuhn, 1970). The Nobel prize winner Gunnar Myrdal (1970) argued against suppressing value judgements in the interests of science. Myrdal's solution is to declare theoretical perspectives and value judgments boldly and honestly at the outset of the analysis:

There is no other device for excluding biases in social sciences than to face the valuations and to introduce them as explicitly stated, specific, and sufficiently concretized value premises. ... Emotion and irrationality in science ... acquire their high potency precisely when valuations are kept suppressed or remain concealed in the so-called 'facts' (1944: 1043-1044).

While the positivist style of many published papers may be a persuasive form for the young and the naive, this paper reflects Myrdal's mature view that a substantive paper should set out theories, values, and limitations upfront.

This paper is a partial record of an economic interpretation of an organizational innovation (i.e., forward integration in the U.S. from 1870 to 1920). The orientation of the paper is decidedly economic and efficiency driven. The objective of lowering cost to consumers is viewed as both a desirable goal to achieve and is viewed as a good approximate explanation for the historical pattern of managerial decisions on vertical integration strategy. To be sure, perspectives other than managerial efficiency are important to restore balance in historical understanding. The justification for the economic and managerial account of business history is that proceeding in such a narrowly focused way is in an early developmental stage. The potential fruitfulness of the approach will be realized only if economic and managerial reasoning is rigorously pursued. Excesses should be transparent for a mature, historically oriented audience. Readers are asked to make allowances, and to restore perspectives through the use of alternative theoretical lenses (e.g., political, organizational, and sociological) (see Maitland, Bryson & Van De Ven, 1985).

VERTICAL CONTROL OF COMPLEX GOODS

The 1870-1920 period saw dynamic change and growth in the American economy and its business system (Chandler, 1977). Dynamic factors included the development of the railroad² (Barger, 1951;

² Declining transport costs permitted firms to take advantage of wider market opportunities to realize substantial scale economies in their marketing operations (Atack, 1985).

Fogel, 1964; Taylor & Neu, 1956), the rise of concentrated urban markets for industrial and consumer goods (Kirkland, 1961; Porter, 1973), the coming of mass-production technology (Hidy & Hidy, 1955; Nutter & Einhorn, 1969), the development of electrification (Passer, 1953) and the rise of organized research and development (Schumpeter, 1950). The major effect of these developments stimulated the growth of large, capital-intensive, often vertically integrated firms -- a trend that is revealed even in aggregate statistics. Between 1880 and 1900, the average amount of capital invested per manufacturing establishment increased 75 percent, from \$11,000 to \$19,200, while the capital-output ratio for the manufacturing sector as a whole rose 44 percent (Lamoreaux, 1985).

In the 1870-1920 period Chandler argues that: "modern business enterprise took the place of market mechanisms in coordinating the activities of the economy and allocating its resources" (1977: 1). While the historical evidence is consistent with Chandler's (1977) argument, an organizational economics analysis is still required to consider the managerial options of using the organizational forms of markets (i.e., prices), relational exchange (i.e., long-term contracts, franchising), or hierarchy (i.e., vertical merger). Current economic and managerial efficiency arguments from agency theory (Eisenhardt, 1985, 1989; Jensen & Meckling, 1976; Oviatt, 1988), transaction costs theory (Barney, 1990; Coase, 1937, 1988; Jones, 1984; Williamson, 1971, 1985), and resource-based theory (Conner, 1991; Grant 1991; Mahoney & Pandian, 1992) are used to assess the **differential** efficiency characteristics of each organizational form under various circumstances. The major thesis of the paper was put succinctly by Davis and North over twenty years ago: "It is the possibility of profits that cannot be captured within the existing arrangemental structure that leads to the formation of new (or the mutation of old) institutional arrangements" (1971: 39).

The major efficiency hypothesis is that the vertically integrated firm developed when and where administrative coordination permitted greater productivity via managerial monitoring and lower negotiation and adaptation costs than could be achieved through coordination by market mechanisms (i.e.,

prices, short-term contracts, long-term contracts). Internalization of previous market exchange by hierarchical exchange lowered transaction costs, information costs and measurement costs, and allowed for an effective scheduling of production and distribution. Managers of vertically integrated firms also modified their accounting systems, leading to further cost reductions and increased efficiency (Johnson & Kaplan, 1987).

North (1978: 971) argues that: "the underlying source of the organizational revolution was a radical change in transaction costs and the consequent implications for altering economic organization." The general proposition that managers choose organizational forms that minimize cost and thus benefit customers is operationalized through case studies of firms that produced technologically complex goods. By 1920 a number of firms producing a variety of technologically complex goods had vertically integrated into distribution. A partial list includes: A.B. Dick (Chandler, 1977), Allis-Chalmers (Peterson & Weber, 1978), Babcock & Wilcox (Nielsen, 1967), Burroughs Adding Machine (Porter & Livesay, 1971), Computing-Tabulating-Recording (Chandler, 1977), Deere & Company (Boehl, 1987), Eastman Kodak (Jenkins, 1975), Firestone (Lief, 1951), General Electric (Hammond, 1941), Goodyear (Allen, 1943; O'Reilly & Keating, 1983), International Harvester (Kramer, 1964), Johnson Company (Massouh, 1976), Link-Belt Machinery (Chandler, 1977), National Cash Register (Johnson & Lynch, 1932), Norton Company (Cheape, 1985), Otis Elevator Company (Peterson, 1945), Pittsburgh Plate Glass (Scoville, 1948), Remington Typewriter (Porter & Livesay, 1971), Singer Sewing Machine Company (Jack, 1957), U.S. Rubber (Babcock, 1966), Western Electric (Wilkins, 1970), Westinghouse Air Brake (Chandler, 1990), Westinghouse Electric (Passer, 1953), Winchester Repeating Arms Company (Williamson, 1951) and Worthington Pump and Machine (Chandler, 1990).

In this paper, we consider several firms from this list in some detail. Consider first the Singer Sewing Machine Company which was in many respects a pioneer in developing the channels of distribution. They were a pioneer consumer appliance, the first product to be sold under a consumer

installment plan, and the first product to be sold through a fully developed franchised agency system (Jack, 1957). The reason for their organizational innovation is summarized by Wilkins: "The independent agent did not pay sufficient attention to the product; he did not bother to instruct the buyer how to use the machine; he did not know how to service it; he failed to demonstrate it effectively; and he did not seek new customers aggressively. Independent agents were not prepared to risk their capital to sell goods on installment nor would they risk carrying large stocks" (1970: 43). The new product required distributional innovation in order to demonstrate, instruct, and assist the sewing-machine user. Singer had its own salesrooms to market the product, deliver the machines, assist consumers with trained personnel, maintain attractive outlets, carry an adequate stock of machines, parts and accessories, and repair the machines.

The sales outlets provided information on market trends and competition, so that product development advanced rapidly. In comparison with the sales office, franchised agencies proved to be less effective and more costly (Davies, 1969). The merchandising efforts of the company's own outlets proved so successful that by 1879, Singer severed its relations with all independent merchants, and its distribution network maintained 530 retail outlets (McCurdy, 1978). Singer also devised new types of accounting and statistical controls. These management accounting systems developed by Singer and others allowed extensive vertical integration since these systems lowered internal integrating costs.

Chandler observed that the economic advantage of the Singer Company may be traced to its organization: "That managerial hierarchy recruited, trained, and carefully supervised the canvasser-collector; provided long-term consumer credit; assured continuing servicing of the machines sold; and, finally, permitted a smooth and reliable distribution of the 20,000 to 25,000 machines shipped each week to all parts of the world" (1977: 405). Thus, the essence of Singer's economic and managerial advantage took the form of relatively specific human resources. The Singer Company initially held no technical advantages and no decisive patent monopoly over major competitors because four firms (including Singer)

had been forced to pool their patents. The most imposing barriers to imitation that rivals and potential competitors faced were the first-mover advantages (Lieberman & Montgomery, 1988) that Singer maintained in the form of organizational and human resources. The process of internalization of marketing functions led to a distinctive competence (Andrews, 1971; Selznick, 1957) by Singer Company that could not be easily imitated. Vertical integration by Singer was a source of sustainable competitive advantage (Ghemawat, 1986). Vertical integration proved to be an organizational form that allowed the firm to control quality and to minimize the cost of achieving Singer's desired level of quality.

Vertical control appears to have been a significant element in the success of McCormick Harvesting Company's distribution of the complex mechanical reaper (Livesay, 1979; Olmstead, 1975). The McCormick Company initiated many distributional innovations. They pioneered the use of widespread advertising; provided a warranty for their reapers; and they provided credit to farmers to purchase the machine under installment plans (McCormick, 1931). The company also appointed responsible agents to supervise their storage warehouses that they built at various locations. The salesmen were often trained mechanics (Hutchinson, 1930, 1935). They assembled the machines when they arrived from the factory and demonstrated their operations to potential customers. McCormick's trained personnel also adjusted machines to accommodate the needs of individual buyers and the personnel were available for making running repairs. By 1849, the McCormick Company had nineteen franchised agencies. McCormick initiated an exclusive-dealing arrangement for the first large-scale franchising system in the United States (Casson, 1909). McCormick's superior marketing strategy proved to be a key success factor for superior performance (Hounshell, 1984).

Once again, vertical control of distribution improved quality and lowered cost. Indeed, vertical control was an important part of the "core competence" of McCormick (Prahalad & Hamel, 1990). Vertical franchising contracts and later vertical merger by McCormick proved to be a source of sustainable competitive advantage (Reed & DeFillippi, 1990). In 1904, the McCormick company was

united with its four largest competitors forming International Harvester (Kramer, 1964). Harvester "ran successfully as a tightly centralized, vertically integrated, functionally departmentalized organization" (Chandler, 1956: 130).

Change in the scale and nature of operations in electrical manufacturing required the invention and application of new organizational forms. The significant characteristic of the market for electrical products was that business firms' "activities and requirements had to be known to the electrical manufacturer's salesmen if the latter were to do an effective job of selling. In addition, the salesmen had to make sure that the equipment was properly installed and that it operated satisfactorily. In effect, then, the electrical products salesmen were sales engineers" (Passer, 1952: 394). The competitive advantage obtained by General Electric and Westinghouse in the 1890s was due, in large part, to their organizational and human resources (Passer, 1953).

The centralization of marketing enabled the sales force to obtain information on consumers' specific needs. Communication between the production department and the marketing department enabled coordination between customers with customized requirements and manufacturers with complex producing equipment. The marketing of electrical lighting, power machinery, and traction equipment was complicated technologically so that trained salesmen with expertise in engineering were essential. Moreover, the specifications for heavy equipment were very precise so that the salesmen had to be in close contact with the manufacturing departments. A contractual arrangement was not satisfactory because the speed of information flow and quality of message transmitted depended on the goodwill of a large number of independent system members who had little incentive to transmit such information, resulting in ineffective communication. This defect was critical when information about demand characteristics, the competitive environment, or product innovation was important.

The lighting system, power system, and transportation system were part of a complete system where effective coordination of manufacturing, selling, and instructing services were essential. The

vertical integration of manufacturing and marketing enabled the development of specific language and standard reports, plans, and forecasts which sped up transmission of communication. Where such factors were less critical, vertical integration was not necessary. For example, General Electric and Westinghouse continued to market simple consumer products such as lightbulbs through independent wholesale houses. Also, standardized machinery, such as stationary steam engines, standard boilers, lathes and other similar machinery were sold by the usual market network of jobbers and wholesalers (Porter & Livesay, 1971).

One of the earliest producer-good firms to create a national marketing system staffed with its own trained employees was the Johnson Company. The Johnson Company produced street rails which involved manufacturing both steel and electrical products that relied on new and sophisticated technologies. The product required trained salesmen because "every order for track was custom tailored, since every city had different geographical and topological characteristics" (Massouh, 1976: 52). In 1883, the Johnson Company created its own national distribution system and was the major supplier for the twenty-one thousand miles of new track that were laid for electric street railways between 1890 and 1902. Johnson's organizational and human resources led to sustained competitive advantage (Barney, 1991).

Extensive marketing organizations were also necessary for new machines to be sold in high volume (Livesay & Porter, 1969). National Cash Register (NCR) dominated their business by setting up networks of branch retail outlets administered by regional offices. NCR pioneered the extensive use of exclusive territories to agents (Johnson & Lynch, 1932). NCR grew rapidly after 1885 when they provided credit and repair services and trained their own salesmen. Their advanced marketing organization enabled their sales to increase from 500 registers in 1885 to 15,000 registers by 1892 (Crowther, 1924). Similarly, the Burroughs Adding Machine Company and the Remington Typewriter

Company created a chain of agencies that specialized in the service and sale of their respective products (Porter & Livesay, 1971). George Eastman created a worldwide marketing network of branch offices with managers to supervise salesmen and to coordinate the distribution of his new camera. By the early twentieth century, Eastman Kodak began to build its own retail stores in major cities (Ackerman, 1930; Chandler, 1977). Securing scarce managerial resources was a key success factor for firms to sustain their high performance and growth (Penrose, 1959).

Case studies indicate an historical pattern in which the makers of sewing machines, cameras, typewriters, and cash registers invested in retail outlets. In each case, the machines were complex and only recently invented. Firms that invested in firm-specific resources by training their sales personnel and providing extensive consumer credit obtained a competitive advantage over firms that relied on existing distribution channels. Independent distributors, at this time, rarely provided adequate demonstration, repairs, and consumer credit (Chandler, 1984).

Organizational economic analysis suggests that distributional inadequacies would occur in the price system due to bounded rationality (Simon, 1978) and nonconvergent expectations between independent manufacturers and distributors (Malmgren, 1961). Existing wholesalers and other middlemen did not recognize profitable opportunities. It is also not clear how the price system could signal such opportunities (Williamson, 1980). It might be argued that manufacturers could have obtained services by contract. However, coordination was costly because of high uncertainty. In the cases of electrical equipment, sewing machines, and new office machinery, specialized human resources were required. Small numbers supply relations between manufacturers and independent middlemen would have invited opportunistic attempts at renegotiating contracts. Such hold-ups would have been particularly costly in the cases of consumer and producer durables.

Distributors would be required to make specialized investments that would transform the manufacturer-distributor relationship to a bilateral exchange arrangement (Williamson, 1975).

Independent distributors would be reluctant to commit to these dedicated investments. On the other side, manufacturers would be concerned with the problem of quality shading by independent distributors (Telser, 1960). Distributors might cut back on demonstration, installation, maintenance, and repair services and might profit at the expense of the reputation of the manufacturer's product or trademark.

Proper compensation of distributors may require extensive monitoring (Jones, 1984). Contracting between independent parties gives way to relational contracting (e.g., franchising), if not forward integration due to the problem of quality control over distribution (Phillips & Mahoney, 1985; Rey & Tirole, 1986). Forward integration by manufacturers into distribution was the organizational response to these contracting difficulties.

THE SELECTIVE NATURE OF VERTICAL INTEGRATION

Sectors of the American economy continued under the traditional process of production and distribution where independent wholesalers and independent retailers continued to contract to distribute goods. The goods sold through independent outlets included: breakfast cereals, hand soaps, soup, razor blades, drugs, hardware, jewelry, liquor, furniture, millwork and other wood products, plumbing and building materials, shoes, other leather products, and textiles (Porter & Livesay, 1971: 12-34). By the 1890s, an individual hardware jobber firm, for example, handled 6,000 items purchased from well over 1,000 firms (Becker, 1971). The synergies of selling products through retail outlets made the option of forward integration by manufacturers untenable. For these goods, untrained workers employed for retail sale and service were sufficient.

Where the product was simple and the market diffuse producers continued to find the old means of distribution adequate. Goods and services that could be sold without incurring firm-specific investments continued to be sold through conventional marketing channels. Where manufacturers faced special

marketing problems -- such as the need for rapid distribution with specialized investments (e.g., refrigeration for meats³ and beer), consumer credit, demonstrations (point-of-sale services), highly skilled repair (follow-on services) -- alternative organizational structures were required. Specialized investments transform a competitive environment for contractual relations to small numbers bargaining (haggling) between a manufacturer and distributor. Contracting under such conditions is highly risky (Klein, Crawford & Alchian, 1978).

Where point-of-sale and follow-on services are essential, contracting problems are more likely. Forward integration into sales was a cost minimizing strategy when extensive synergies existed between manufacturing and distribution stages. Frequent transactions required continuous adaptations and required a smooth flow of information. Moreover, without vertical control, distributors might shade quality and harm manufacturers' reputations (Telser, 1960).

Historically, it appears that integrated channels were more commonly used than independent channels for products with high service requirements. This historical pattern also seems to hold true today. Anderson (1985) finds that employee salespeople are more commonly used than contracting for independent salespeople for service-intensive products.

Products where transaction-specific investments were required (e.g., sewing machines, office-machinery, harvesters, electrical equipment) were supported by specialized relational contracts (e.g.,

³ One of the most prominent illustrations of the growth of firms by vertical integration was the history of the meatpacking industry (see, Anderson, 1953; Arnould, 1971; Chandler, 1977; Clemen, 1923; Hill, 1923; James, 1983; Kujovich, 1970; Rhoades, 1929; and Swift & Van Vliissingen, 1927). The major idea that I would add to this literature is that Swift, Armour, Morris, Cudahy and Schwartzchild & Sulzberger built their own refrigerated cars not only because railroads had vested interests in not building the cars since it would make obsolete their heavy investment in stockyards but also because of asset specificity. Refrigeration cars, having little alternative uses, entailed large asset specificity (i.e., a \$25,000 investment per car and high switching costs to convert the cars for general use). Railroads that built these cars would find themselves at the mercy of packers to provide sufficient volume to properly utilize the expensive equipment. By 1917, the interstate meatpackers owned all but 275 of the 16,875 "beef" cars in the United States (i.e., those fitted with brine tanks required for securing low enough temperatures for shipment). In contrast, railroad cars that had low asset specificity (i.e., general purpose cars which had many alternative uses) were built by the railroads. Railroads owned their own general service stock cars, for when not in use to transport stock it could be, and often was, used for other freight (Clemen, 1923).

franchising) or unified governance (e.g., forward vertical merger, internal development of marketing functions). Forward integration is preferred due to incentive, adaptability, monitoring, dispute settling, and reward refining attributes (Williamson, 1985).

In the case of American Sugar Refining, manufacturers of an undifferentiated durable consumer good, attempted to forward integrate. This strategic move by American Sugar Refining resulted in large economic losses (Porter & Livesay, 1971). Also, large brewers in the late 1800s attempted to develop a system of tied houses, along the lines of the English system, with taverns having exclusive relationships with one brewer's product. The maintenance of the system was excessively costly, leading to a competitive disadvantage, and brewers went back to the old system of selling to independents (Cochran, 1948). These cases illustrate that when no economic synergy is present, vertical integration for its own sake was not sustainable.

Porter and Livesay (1969) propose a market power explanation for the selective nature of forward integration. They note that: "the incidence of oligopoly and large size are much less frequent among manufacturers that did not integrate than among those that did integrate" (1971: 214). Similarly, Lamoreaux (1985) and O'Brien (1988) argue that the suppression of competition was the major motive for (vertical) mergers at the turn of the century. However, in fact, large firm/concentrated industry groups are included among nonintegrators: breakfast cereals, hand soaps, razor blades, and soups. These would be major candidates for forward integration if oligopolistic preference rather than efficiency considerations were determining organizational forms.

When examining closely the success and failure of mergers of the great merger wave at the turn of the century⁴, a high proportion of successful mergers were firms that vertically integrated (Chandler, 1977; Livermore, 1935). This successful strategy of growth through vertical integration continued until

⁴ Less than half of the large firms that were formed in the turn of the century merger movement survived until 1919 (Fligstein, 1990: Appendix B; Nelson, 1959).

the 1920s (Chandler, 1977). Combinations which lacked efficiency gains from economies of scale, economies of speed, technological interdependence (economies of scope⁵), and/or improved quality control suffered losses (e.g., National Cordage, American Biscuit, United States Leather, National Wall Papers, National Starch, American Glue, American Hide & Leather, American Writing Paper, and American Woolen Company and Central Leather).

If foreclosure of markets, manipulating securities, controlling competition and achieving market power were the major motives for vertical integration as Porter & Livesay (1971), Lamoreaux (1985) and O'Brien (1988) suggest, then it is incumbent upon those who maintain this thesis to explain (in a more convincing manner than the managerial efficiency theory) why vertical integration did not occur or was unsuccessful in textiles, lumber, furniture, leather and publishing & printing in the 1870-1920 period. In managerial efficiency terms, these industrials required no specialized investments or specialized point-of-sale or follow-on services. Comprehensive integration entails costs of lost economies of scope and incentive deficiencies inherent in integration. On the other hand, the financial success of Singer Sewing Machine, General Electric, Eastman Kodak, Armour, Swift, and other integrated firms, illustrate the value of forward integration into marketing where real economies were achieved. In sum, Chandler (1984: 491) argues that:

[T]he large industrial firm that integrated mass production and mass distribution appeared in industries with two characteristics. The first and most essential was a technology of production in which the realization of potential scale economies and maintenance of quality control demanded close and constant coordination and supervision of materials flows by trained managerial teams. The second was that volume marketing and distribution of their products required investment in specialized, product-specific human and physical capital.

⁵ For a detailed economic analysis of economies of scope, see Baumol, Panzar and Willig (1982) who argue that economies of scope are a necessary and sufficient condition for the existence of the firm. However, see Teece (1980) who argues that technological synergies are not sufficient to explain organization within the firm, since savings may be achieved by contracts in the absence of transaction costs. Hence, economies of the scope do not necessarily explain the "scope of the firm".

CONCLUSIONS ON THE HISTORICAL SIGNIFICANCE OF VERTICAL CONTROL

In interpreting the history of an important organizational innovation in the 1870-1920 period, this paper has maintained an organizational economics framework. This paper argues that the rise of the modern vertically integrated enterprise between 1870 and 1920 was not the result of exploitation of workers⁶ (Marglin, 1974; Stone, 1974), nor of capital market imperfections (Davis, 1965), nor of antitrust policy (Bittlingmayer, 1985). Rather, the vertically integrated firm was "the organizational response to fundamental changes in processes of production and distribution made possible by the availability of new sources of energy ...Changes in transportation, communication, and demand brought a revolution in the process of distribution. And where the new mass marketers had difficulty in handling the output of the new processes of production, the manufacturers integrated mass production with mass distribution" (Chandler, 1977: 376).

Chandler's analysis does not, however, explain why new mass marketers had difficulties and why vertically integrated firms had a comparative advantage. An organizational economics interpretation addresses the sources of marketing inadequacies and considers why integration varies across industries. Where distribution synergies were significant, the need to extend quality control by vertical control was imperative. Quality shading by distributors may be very costly to detect in a contractual relationship. Vertical control minimizes this problem. In addition to so-called free-rider problems (i.e., some independent distributors may shade quality), organizational economics and managerial analysis highlight the importance of firm-specific investments (Stuckey, 1983; Walker & Weber, 1987). In particular, firm-specific human resources were critical for new complex goods such as sewing machines, electrical equipment, harvesters, and office machines. "Modern" management theories that emphasize the importance of firm-specific resources (Dierickx & Cool, 1989; Schoemaker, 1990; Wernerfelt, 1984)

⁶ For an insightful essay that attempts to build a bridge between radical economics and organizational economics, see Goldberg (1980).

were, at least implicitly, known by many successful managers of complex goods at the turn of the twentieth century.

To extend the organizational economic analysis, Robins (1987) suggests that agency and transaction costs theory can make a major contribution to bridge social and economic perspectives. Many of the transactions that took place in 1920 were fundamentally different from the transactions in 1870. The problems of large, fixed capital investment (Lamoreaux, 1985) that had low scrap value and that required an exchange relationship over long periods of time (high uncertainty and high frequency) were now prominent in several major industries in the United States (North, 1981). Also, there was an ever increasing cost in measuring the quality of goods and services⁷ (Barzel, 1982). Vertical integration was the organizational response to the control problem of shirking in team production (Alchian & Demsetz, 1972; Jones, 1984) and was also a response to the transaction costs of negotiating and enforcing exchange agreements, where firm-specific human resources and firm-specific physical capital were becoming increasingly important in an environment of rapid technological innovation and increasing consumer demand⁸ in the United States during the 1870-1920 period.

Leblebici rightly argues that: "Chandler also provides qualified support for a resource-based view of the firm" (1991: 631). Chandler (1977, 1990) documents the importance of a firm's resources, creating organizational capabilities and firm-specific skills. At the core of the underlying dynamic in the development of modern industrial capitalism: "were the organizational capabilities of the enterprise as a unified whole. These organizational capabilities were the collective physical facilities and human skills

⁷ Goldin (1986: 8) notes that: "It is generally presumed that one can monitor output quality more cheaply in lower quality goods than in high quality goods. In the latter, one may want to screen workers and hire only those who will produce goods of uniformly high quality and then supervise only by input [i.e., hierarchy]. Such was the case in the manufacturing of clothing at the turn of the century; high quality coats, for example were made by skilled tailors working on time (i.e., salary), while lower quality coats were made by less skilled operators working by the piece."

⁸ For an analysis of the effect of demand on vertical integration, see Stigler's (1951) extensions of Adam Smith (1776); however, see also Porter & Livesay (1971, p.132) and Stuckey (1983).

as they were organized within the enterprise. ...Such organizational capabilities, of course, had to be created, and once established, they had to be maintained. Their maintenance was as great a challenge as their creation, for facilities depreciate and skills atrophy. ...Such organizational capabilities, in turn, have provided the source -- the dynamic -- for the continuing growth of the enterprise" (Chandler, 1990: 594). An evolutionary (historical) approach to the firm that emphasizes (path-dependent) organizational capabilities as its central concept, provides a research program that may potentially unite the theoretical with the practical (Chandler, 1992; Nelson, 1991; Nelson & Winter, 1982).

The conceptual lens of organizational economics provides alternative hypotheses to challenge market power assertions, increasing content for empirical testing. Further, it is maintained that historical analysis of vertical integration does not limit generalizability, it clarifies it (Goodman & Kruger, 1988; Lawrence, 1984). The study of entrepreneurs groping with the problems inherent in the distribution and service of technologically complex goods provides a wealth of insights in understanding our "institutions of capitalism".

Current managerial theories of markets, relational contracts, and hierarchies (Borys & Jemison, 1989) may be checked by history. The use of theory in managerial history illuminates the theory and tests it (Leontiades, 1989). Jensen (1983) argues that it is unwise to ignore important institutional evidence while spending a great deal of attention on unimportant quantitative evidence because it is more familiar.

History is a stimulus to the economic and management imagination (McCloskey, 1976). History provides relevance for current problems of formulating and implementing a vertical integration strategy. While many theoretical management researchers argue that there is "nothing quite so practical as a good theory," researchers in management history need to remind colleagues that there is also nothing so theoretical as a good practice.

REFERENCES

- Ackerman, C. W. 1930. *George Eastman*. Boston: Houghton Mifflin.
- Alchian, A. A. & Demsetz, H. 1972. Production, information costs, and economic organization. *American Economic Review*, 62: 777-795.
- Allen, H. 1943. *The house of Goodyear: A story of rubber and modern business*. Cleveland, Ohio: Corday and Gross.
- Anderson, E. 1985. The salesperson as outside agent or employee: a transaction cost analysis. *Marketing Science*, 4: 234-254.
- Anderson, O. 1953. *Refrigeration in America: A history of a new technology and its impact*. Princeton: Princeton University Press.
- Andrews, K. 1971. *The concept of the corporation*. Homewood, IL: Irwin.
- Arnould, R. J. 1971. Changing patterns of concentration in American meat packing, 1880-1963. *Business History Review*, 45: 18-34.
- Atack, J. 1985. Industrial structure and the emergence of the modern industrial corporation. *Explorations in Economic History*, 22: 29-52.
- Babcock, G. D. 1966. *History of the United States Rubber Company*. Bloomington, IN: Bureau of Business Research, Graduate School of Business, Indiana University.
- Barger, H. 1951. *The transportation industry 1889-1946*. NY: National Bureau of Economic Research.
- Barger, H. 1955. *Distribution's place in the american economy since 1869*. Princeton: Princeton University Press.
- Barney, J. B. 1990. The debate between traditional management theory and organizational economics: Substantive differences or intergroup conflict? *Academy of Management Review*, 15: 382-393.
- Barney, J. B. 1991. Firm resources and sustained competitive advantage. *Journal of Management*, 17: 99-120.
- Barney, J. B, & Ouchi, W. G. (Eds.) 1986. *Organizational economics: Toward a new paradigm for understanding and studying organizations*. San Francisco: Jossey-Bass.
- Barzel, Y. 1982. Measurement cost and the organization of markets. *Journal of Law and Economics*, 25: 27-48.

- Baumol, W. J., Panzar, J. C. & Willig, R. D. 1982. Contestable markets and the theory of industrial structure. New York: Harcourt Brace Jovanovich.
- Becker, W. H. 1971. American wholesale hardware trade associations, 1870-1900. *Business History Review*, 45: 179-200.
- Bittlingmayer, G. 1985. Did antitrust policy cause the great merger wave? *Journal of Law and Economics*, 28: 77-118.
- Boehl, W. G. 1984. John Deere's Company: A history of Deere and Company and its times. New York: Doubleday.
- Borys, B. & Jemison, D. B. 1989. Hybrid arrangements as strategic alliances: Theoretical issues in organizational combinations. *Academy of Management Review*, 14: 234-249.
- Bowman, E. H. 1990. Strategy changes: Possible worlds and actual minds. In J. Fredrickson (ed.), *Perspectives on Strategic Management* (pp. 9-37). New York: Harper.
- Casson, H. N. 1909. Cyrus Hall McCormick: his life and work. Chicago: A.C. McClurg.
- Chandler, A. D., Jr. 1956. Management decentralization: An historical analysis. *Business History Review*, 30: 111-174.
- Chandler, A. D., Jr. 1962. *Strategy and structure: Chapters in the history of the industrial enterprise*. Cambridge: MIT Press.
- Chandler, A. D., Jr. 1977. *The visible hand: The managerial revolution in american business*. Cambridge: Belknap Press.
- Chandler, A. D., Jr. 1984. The emergence of managerial capitalism. *Business History Review*, 58: 473-503.
- Chandler, A. D., Jr. 1990. *Scale and scope: The dynamics of industrial capitalism*. Cambridge, MA: Harvard University Press.
- Chandler, A. D., Jr. 1992. What is a firm? A historical perspective. *European Economic Review*, 36: 483-492.
- Cheape, C. W. 1985. Family firm to modern multinational: Norton Company, a New England enterprise. Cambridge, MA: Harvard University Press.
- Clark, G. 1984. Authority and efficiency: The labor market and the managerial revolution of the late Nineteenth century. *Journal of Economic History*, 44: 1069-1083.
- Clemen, R. A. (1923). *The American livestock and meat industry*. New York: Ronald Press.
- Coase, R. H. 1937. The nature of the firm. *Economica*, 4: 386-405.

- Coase, R. H. 1988. *The firm, the market and the law*. Chicago: University of Chicago Press.
- Cochran, T. C. 1948. *The Pabst Brewing Company*. New York: New York University Press.
- Cole, A. H. 1968. The entrepreneur: introductory remarks. *American Economic Review*, 58: 60-63.
- Conner, K. R. 1991. An historical comparison of resource-based theory and five schools of thought within industrial economics: Do we have a new theory of the firm? *Journal of Management*, 17: 121-154.
- Crowther, S. 1924. *John H. Patterson: pioneer in industrial welfare*. New York: Doubleday.
- Davies R. B. 1969. 'Peacefully working to conquer the world:' The Singer Manufacturing Company in foreign markets, 1854-1889. *Business History Review*, 43: 299-325.
- Davis, L. 1965. The investment market, 1870-1914: the evolution of a national market. *Journal of Economic History*, 25: 359-399.
- Davis, L. E. & North, D. C. 1971. *Institutional change and American economic growth*. London: Cambridge University Press.
- Dierickx, I., & Cool, K. 1989. Asset stock accumulation and sustainability of competitive advantage. *Management Science*, 35: 1504-1511.
- DuBoff, R. B. 1980. Business demand and the development of the telegraph in the United States, 1844-1860. *Business History Review*, 54: 459-479.
- Eggertsson, T. 1990. *Economic behavior and institutions*. Cambridge: Cambridge University Press.
- Eisenhardt, K. M. 1985. Control: organizational and economic approaches. *Management Science*, 31: 134-149.
- Eisenhardt, K. M. 1989. Agency theory: an assessment and review. *Academy of Management Review*, 14: 57-74.
- Federal Trade Commission 1919. *Report on the meat-packing industry*. (Washington, 1919).
- Fligstein, N. 1990. *The transformation of corporate control*. Cambridge: Harvard University Press.
- Fogel, R. W. 1964. *Railroads and American economic growth: Essays in econometric history*. Baltimore, MD: John Hopkins Press.
- Ghemawat, P. 1986. Sustainable advantage. *Harvard Business Review*, 64: 53-58.
- Goldberg, V. 1980. Bridges over contested terrain: Exploring the radical account of the employment relationship. *Journal of Economic Behavior and Organization*, 1: 249-274.

- Goldin, C. 1986. Monitoring costs and occupational segregation by sex: A historical analysis. *Journal of Labor Economics*, 1-27.
- Goodman, R. S. & Kruger E. J. 1988. Data dredging or legitimate research method? *Historiography and its potential for management research*. *Academy of Management Review*, 13: 315-325.
- Grant, R. M. 1991. *Contemporary strategy analysis: Concepts, techniques, applications*. Cambridge, MA: Basil Blackwell.
- Hammond, J. W. 1941. *Men and volts: The story of General Electric*. Philadelphia: J. B. Lippencott.
- Harrigan, K. R. 1984. Formulating vertical integration strategies. *Academy of Management Review*, 9: 638-652.
- Harrigan, K. R. 1986. Matching vertical integration strategies to competitive conditions. *Strategic Management Journal*, 7: 535-555.
- Hesterly, W. S., Liebeskind, J., & Zenger, T. 1990. Organizational economics: An impending revolution in organization theory? *Academy of Management Review*, 15: 402-420.
- Hidy, R. W. & Hidy, M. E. 1955. *Pioneering in big business, 1882-1911*. New York: Harper & Brothers.
- Higgs, R. 1971. *The transformation of the American Economy, 1865-1914*. New York: Wiley.
- Hill, C. W. L. 1990. Cooperation, opportunism, and the invisible hand: Implications for transaction cost theory. *Academy of Management Review*, 15: 500-513.
- Hill, H. C. 1923. The development of Chicago as a center of the meat packing industry. *Mississippi Valley Historical Review*, 10: 253-273.
- Hounshell, D. A. 1984. *From the American system to mass production, 1800-1932*. Baltimore: John Hopkins University Press.
- Hutchinson, W. T. 1930. *Cyrus Hall McCormick: Seedtime, 1809-1856*. New York: Century.
- Hutchinson, W. T. 1935. *Cyrus Hall McCormick: Harvest, 1856-1884*. New York: Appleton-Century.
- Jack, A. B. 1957. The channels of distribution for an innovation: the sewing-machine industry in America, 1860-1865. *Explorations in Entrepreneurial History*, 9: 113-141.
- James, J. A. 1983. Structural change in American manufacturing, 1850-1890. *Journal of Economic History*, 43: 433-459.
- Jenkins, R. V. 1975. *Images and enterprise: Technology and the American photographic industry 1839-1925*. Baltimore: John Hopkins University Press.

- Jensen, M. C. & Meckling, W. H. 1976. Theory of the firm: managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3: 305-360.
- Jensen, M. C. 1983. Organization theory and methodology. *Accounting Review*, 58: 319-339.
- Johnson, H. T. & Kaplan, R. S. 1987. *Relevance lost: The rise and fall of management accounting*. Boston, MA: Harvard Business School Press.
- Johnson, R. W. & Lynch, R. W., 1932. *The sales strategy of John H. Patterson, founder of the National Cash Register Company*. New York: Dartnell Corporation.
- Jones, G. R. 1984. Task visibility, free riding, and shirking: explaining the effect of structure and technology on employee behavior. *Academy of Management Review*, 9: 684-695.
- Kaplan, A. 1964. *The conduct of inquiry: methodology for behavioral science*. San Francisco: Chandler Publishing Company.
- Kirkland, E. C. 1961. *Industry comes of age: Business, labor, and public policy, 1860-1897*. New York: Holt, Rinehart & Winston.
- Klein, B., Crawford, R. G. & Alchian A. A. 1978. Vertical integration, appropriable rents, and the competitive contracting process. *Journal of Law and Economics*, 21: 297-326.
- Kramer, H. M. 1964. Harvesters and high finance: Formation of the International Harvester Company. *Business History Review*, 38: 283-301.
- Kuhn, T. 1970. *The structure of scientific revolutions*. Chicago: University of Chicago Press.
- Kujovich, M. Y. 1970. The refrigerator car and the growth of the American dressed beef industry. *Business History Review*, 44: 460-482.
- Lamoreaux, N. R. 1985. *The great merger movement in American business, 1895-1904*. Cambridge: Cambridge University Press.
- Larson, H. M. 1948. *Guide to business history*. Cambridge, MA: Harvard University Press.
- Lawrence, B. S. 1984. Historical perspective: using the past to study the present. *Academy of Management Review*, 9: 307-312.
- Lebergott, S. 1966. United States transport advance and externalities. *Journal of Economic History*, 26: 437-461.
- Leblebici, H. 1991. Scale and scope: The dynamics of industrial capitalism, by Alfred D. Chandler, Jr. [Book Review]. *Academy of Management Review*, 16: 628-631.
- Leontiades, M. 1989. *Mythmanagement: An examination of corporate diversification as fact and theory*. Oxford: Basil Blackwell.

- Lieberman, M. B., & Montgomery, D. B. 1988. First-mover advantages. *Strategic Management Journal*, 9 (Summer): 41-58.
- Lief, A. 1951. *The firestone story: A history of the firestone tire & rubber company*. New York: Whittlesey House.
- Lippman, S., & Rumelt, R. 1982. Uncertain imitability: An analysis of interfirm differences in efficiency under competition. *Bell Journal of Economics*, 13: 418-438.
- Livermore, S. 1935. The success of industrial mergers. *Quarterly Journal of Economics*, 50: 68-96.
- Livesay, H. 1979. *American made: Men who shaped the American economy*. Boston: Little, Brown and Company.
- Livesay, H. C. & Porter, P. G. 1969. Vertical integration in American manufacturing, 1899-1948. *Journal of Economic History*, 29: 494-500.
- Mahoney, J. T. & Pandian, J. R. 1992. The resource-based view within the conversation of strategic management. *Strategic Management Journal*, 13: 363-380.
- Maitland, I., Bryson, J., & Van De Ven, A. 1985. Sociologists, economists, and opportunism. *Academy of Management Review*, 10: 59-65.
- Malmgren, H. B. 1961. Information, expectations and the theory of the firm. *Quarterly Journal of Economics*, 75: 399-421.
- Marglin, S. A. 1974. What do bosses do? The origins and functions of hierarchy in capitalist production. *Review of Radical Political Economics*, 6: 60-112.
- Massouh, M. 1976. Technological and managerial innovation: The Johnson company, 1883-1898. *Business History Review*, 50: 46-68.
- McCloskey, D. N. 1976. Does the past have useful economics? *Journal of Economic Literature*, 14, 434-461.
- McCloskey, D. N. 1985. *The rhetoric of economics*. Madison: University of Wisconsin Press.
- McCormick, C. 1931. *The century of the reaper*. Boston: Houghton Mifflin.
- McCurdy, C. W. 1978. American law and the marketing structure of the large corporation, 1875-1890. *Journal of Economic History*, 38: 631-649.
- Myrdal, G. 1944. *An American dilemma*. New York: Harper & Row.
- Myrdal, G. 1970. *Objectivity in social research*. London: Gerald Duckworth.
- Nelson, R. L. *Merger movements in American industry 1895-1956*. Princeton: Princeton University Press.

- Nelson, R. R. 1991. Why do firms differ, and how does it matter? *Strategic Management Journal*, 12 (Winter): 61-74.
- Nelson, R. R., & Winter S. G. 1982. An evolutionary theory of economic behavior and capabilities. Cambridge: Harvard Press.
- Nielsen, M. 1967. The Babcock & Wilcox Company 1867-1967: A century of progress. New York: Newcomen Society in North America.
- North, D. C. 1978. Structure and performance: The task of economic history. *Journal of Economic Literature*, 16: 963-978.
- North, D. C. 1981. Structure and change in economic history. New York: W.W. Norton and Company.
- North, D. C. 1990. Institutions, institutional change and economic performance. Cambridge: Cambridge University Press.
- Nutter, G. W. & Einhorn, H. 1969. Enterprise monopoly in the United States: 1899-1958. New York: Columbia University Press.
- O'Brien, A. 1988. Factory size, economies of scale and the great merger wave of 1898-1902. *Journal of Economic History*, 48: 639-649.
- Olmstead, A. L. 1975. The mechanization of reaping and mowing in American agriculture, 1833-1870. *Journal of Economic History*, 35: 327-352.
- O'Reilly, M. & Keating, J. T. 1983. The Goodyear story. Elmsford, NY: Benjamin Company.
- Oviatt, B. M. 1988. Agency and transaction cost perspectives on the manager-shareholder relationship: Incentives for congruent interests. *Academy of Management Review*, 13: 214-225.
- Passer, H. C. 1952. Electrical manufacturing around 1900. *Journal of Economic History*, 12: 378-395.
- Passer, H. C. 1953. The electrical manufacturers, 1875-1900: A study in competition, entrepreneurship, technical change and economic growth. Cambridge, MA: MIT Press.
- Penrose, E. T. 1959. The theory of the growth of the firm. Oxford: Blackwell.
- Petersen, L. A. 1945. Elisha Graves Otis, 1811-1861 and his influence upon vertical transportation. New York: The Newcomen Society of New England.
- Peterson, W. F. & Weber, C. E. 1978. An industrial heritage: Allis-Chalmers Corporation. Milwaukee, WI: Milwaukee County Historical Society.
- Phillips, A. & Mahoney, J. 1985. Unreasonable rules and rules of reason: economic aspects of vertical price-fixing. *Antitrust Bulletin*, 30: 99-115.

- Porter, P. G. 1973. *The rise of big business, 1860-1910*. New York: Thomas Y. Crowell Company.
- Porter, P. G. & Livesay, H. C. 1969. Oligopolists in American manufacturing and their products, 1909-1963, *Business History Review*, 43: 282-298.
- Porter, P. G., & Livesay, H. C. 1971. *Merchants and manufacturers: studies in the changing structure of nineteenth century marketing*. Baltimore: John Hopkins University Press.
- Prahalad, C. K., & Hamel, G. 1990. The core competence of the corporation. *Harvard Business Review*, 90: 79-91.
- Reed, R. & DeFillippi, R. J. 1990. Causal ambiguity, barriers to imitation, and sustainable competitive advantage. *Academy of Management Review*, 15: 88-102.
- Rhoades, E. L. 1929. *Merchandising packinghouse products*. Chicago: University of Chicago Press.
- Robins, J. A. 1987. Organizational economics: notes on the use of transaction-cost theory in the study of organizations. *Administrative Science Quarterly*, 32: pp. 68-86.
- Rey, P., & Tirole, J. 1986. The logic of vertical restraints. *American Economic Review*, 76: 921-939.
- Robertson, R. M., & Walton, G. M. 1979. *History of the American economy*. New York: Harcourt Brace Jovanovich.
- Rumelt, R. P. 1984. Towards a strategic theory of the firm. In R. Lamb (ed.), *Competitive Strategic Management* (pp. 556-570). Englewood Cliffs, N.J.: Prentice-Hall.
- Rumelt, R. P., Schendel, D. & Teece, D. J. 1991. Strategic management and economics. *Strategic Management Journal*, 12: 5-29.
- Schoemaker, P. J. H. 1990. Strategy, complexity and economic rent. *Management Science*, 36: 1178-1192.
- Schumpeter, J. A. 1950. *Capitalism, socialism and democracy*. New York: Harper & Brothers.
- Scoville, W. C. 1948. *Revolution in glassmaking: Entrepreneurship and technological change in the American industry, 1880-1920*. Cambridge MA: Harvard University Press.
- Selznick, P. 1957. *Leadership in administration*. New York: Harper & Row.
- Simon, H. A. 1978. Rationality as process and as product of thought. *American Economic Review* (Proceedings), 68, 1-16.
- Smith, A. 1776. *An inquiry into the nature and causes of the wealth of nations*. New York: Modern Library (1937 edition).
- Stigler, G. J. 1951. The division of labor is limited by the extent of the market. *Journal of Political Economy*, 59, 185-193.

- Stone, K. 1974. The origins of job structures in the steel industry. *Review of Radical Political Economics*, 6 (Summer): 61-97.
- Stuckey, J. 1983. Vertical integration and joint ventures in the Aluminum industry. Cambridge, MA: Harvard University Press.
- Swift, L. F. & Van Vliissingen, A., Jr. 1927. The Yankee of the yards: The biography of Gustavus Franklin Swift. New York: A. W. Shaw.
- Taylor, G. R. & Neu, I. S. 1956. The American railroad network, 1861-1890. Cambridge, MA: Harvard University Press.
- Teece, D. S. 1980. Economies of scope and the scope of the enterprise. *Journal of Economic Behavior and Organization*, 1: 223-247.
- Teece, D. S. 1982. Towards an economic theory of the multiproduct firm. *Journal of Economic Behavior and Organization*, 3: 39-63.
- Telser, L. G. 1960. Why should manufacturers want fair trade? *Journal of Law and Economics*, 3: 86-105.
- Thompson, R. L. 1947. Wiring a continent: The history of the telegraph industry in the United States 1832-1866. Princeton, N.J.: Princeton University Press.
- Walker, G. & Weber, D. 1987. Supplier competition, uncertainty and make-or-buy decisions. *Academy of Management Journal*, 30: 589-596.
- Wernerfelt, B. 1984. A resource-based view of the firm. *Strategic Management Journal*, 5: 171-180.
- Wilkins, M. 1970. The emergence of multinational enterprise. Cambridge: Harvard University Press.
- Williamson, H. F. 1951. Management and innovations: The Winchester Repeating Arms Company, A case study. *Bulletin of the Business Historical Society*, 25: 1-14.
- Williamson, O. E. 1971. The vertical integration of production: Market failure considerations. *American Economic Review*, 61: 112-123.
- Williamson, O. E. 1975. Markets and hierarchies: analysis and antitrust implications. New York: Free Press.
- Williamson, O. E. 1979. Transaction-cost economics: The governance of contractual relations. *Journal of Law and Economics*, 22: 233-261.
- Williamson, O. E. 1980. Emergence of the visible hand: Implications for industrial organization. In A. D. Chandler and H. Daems (Eds.) *Managerial Hierarchies* (pp. 182-202). Cambridge, MA: Harvard University Press.

Williamson, O. E. 1982. Microanalytic business history. Center for the study of organizational innovation. Philadelphia, PA: University of Pennsylvania, discussion paper #127 (April 1982).

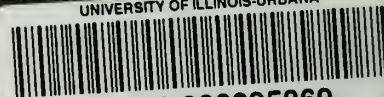
Williamson, O. E. 1985. The economic institutions of capitalism: firms, markets, relational contracting. New York: Free Press.

Williamson, O. E. 1991. Strategizing, economizing, and economic organization. *Strategic Management Journal*, 12 (Winter): 75-94.

Yao, D. A. 1988. Beyond the reach of the invisible hand: Impediments to economic activity, market failures, and profitability. *Strategic Management Journal*, 9 (Summer): 59-70.



UNIVERSITY OF ILLINOIS-URBANA



3 0112 060295869